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March 6, 1995

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Mr. William F. Caton  
Secretary  
Federal Communications Commission  
1919 M Street N.W., Room 222  
Washington, D.C. 20554

MAR - 6 1995  
FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF SECRETARY

**DOCKET FILE COPY ORIGINAL**

**Re: Preparation for International Telecommunication Union  
World Radiocommunication Conferences; IC Docket No.  
94-31**

Dear Mr. Caton:

Enclosed for filing is an original and four copies of the Comments of GE American Communications, Inc. in the above-referenced proceeding. Please date-stamp the extra copy provided and return it to our messenger.

If you have any questions about this matter, please contact the undersigned.

Sincerely,



Julie T. Barton

Enclosures

cc: Scott Blake Harris  
Thomas Tycz  
Fern J. Jarmulnek  
Kristi Kendall

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Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554

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OFFICE OF SECRETARY

In the Matter of

Preparation for International  
Telecommunication Union World  
Radiocommunication Conferences

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IC Docket No. 94-31

COMMENTS OF GE AMERICAN COMMUNICATIONS, INC.

GE AMERICAN  
COMMUNICATIONS, INC.

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March 6, 1995

## SUMMARY

GE Americom is primarily concerned with two important issues presented by WRC-95. First, the United States must ensure that continued growth in FSS is possible in order to meet the needs of the future. GE Americom does not oppose spectrum allocations that offer opportunities to new MSS systems, but would emphasize that those allocations should not be at the expense of future expansion of FSS. To this end, GE Americom rejects the IAC proposal to relax RR2613 in bands shared by GSO FSS and MSS feeder links. Relaxation of that rule could threaten the operation of GSO FSS in all bands in which proposed activity by MSS feeder links would occur. GE Americom also strongly recommends that nothing be done at WRC-95 that will make equitable sharing of the Ka-band impossible. The Commission should also recommend that FSS services be further protected in the planned bands.

The second important issue to GE Americom is the allocation of additional NVNG spectrum at WRC-95. The public will be disserved by any delay in allocation of additional NVNG spectrum. The number of proposed domestic and international NVNG system indicates that the current allocation is too narrow to meet system demand. The 1995 customer demand projections have already exceeded those used as support for allocation at WRC-92. Current projections set demand in North America at 13 million users within the next 5 years. The public interest requires allocation of additional spectrum at WRC-95 in order to meet this increasing demand. The Commission should recommend allocation of several new bands based on important criteria for suitability for NVNG operations.

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IC Docket No. 94-31

To: The Commission

**COMMENTS OF GE AMERICAN COMMUNICATIONS, INC.**

GE American Communications, Inc. ("GE Americom"), by its attorneys, respectfully submits these comments on the Second Notice of Inquiry ("Second NOI") in the above-captioned proceeding.

**INTRODUCTION**

The 1995 World Radiocommunication Conference ("WRC-95") presents vitally important issues for the future of satellite communications in this country and around the world. GE Americom has two overriding concerns. First, the United States must ensure that opportunities exist for continued growth in the fixed satellite service ("FSS") to meet future requirements beginning in the next decade. We are not opposed to revision of spectrum allocations that create opportunities for new mobile satellite service ("MSS") systems. However, those changes must be consistent with the growth requirements of the FSS service.

Second, GE Americom strongly supports the allocation of additional spectrum at WRC-95 for MSS Below 1 GHz ("NVNG") service. The small current allocation, while sufficient to permit competitive service to begin, is not adequate to meet expansion requirements of NVNG systems to satisfy even conservative demand

projections. As a result, NVNG service will be stunted, and the public denied adequate service, if further NVNG allocations are postponed until WRC-97.

These matters are discussed in more detail below.

**I. THE COMMISSION'S PROPOSALS SHOULD BE MODIFIED TO MINIMIZE INTERFERENCE WITH EXISTING AND POTENTIAL FIXED SATELLITE SERVICES.**

As the Commission knows, FSS spectrum in the C- and Ku-bands is approaching capacity. At the same time, demand for FSS service continues to grow. FSS will be a significant element of the nation's telecommunications infrastructure in the 21st century, and satellite operators will need spectrum to meet those requirements.

GE Americom therefore is seriously concerned about those elements of the NOI that propose MSS use of FSS bands. While we support the allocation of sufficient spectrum above 1 GHz to permit MSS systems to operate, it is critical that the FSS service not be unreasonably prejudiced by such allocations. Certain of the MSS proponents are seeking allocation of spectrum that is both overreaching in quantity and preclusive in the extent to which it may cause interference to future FSS service. The most serious of these objections are emphasized below.

**A. RR2613 Should Not Be Relaxed In Those Bands Shared By GSO FSS With MSS Feeder Links.**

The IAC proposes that RR2613 be relaxed in those bands shared by GSO FSS and MSS feeder links. GE Americom rejects this position. RR2613 was designed to protect the operations of GSO FSS, and relaxing the rule could seriously damage operation of GSO FSS satellites in all bands in which proposed activity by MSS feeder links would occur. GE Americom is especially concerned with proposed feeder link activity above 17 GHz, particularly in the bands 17.7-20.2 GHz and

28.5-30.0 GHz. 1/ FSS proponents contend that it is unlikely that geostationary and non-geostationary systems can share bands on a co-frequency basis. Every time a non-geostationary satellite passes between a geostationary spacecraft and its corresponding downlinking FSS station, or uplinking FSS station, there will be potentially unacceptable interference. Eliminating RR2613 would preclude this band from use by geostationary satellite systems due to this interference. 2/

GE Americom also is concerned about the proposal to give MSS priority status over GSO FSS in the planned bands below 17 GHz, particularly in the bands 10.7-10.95 GHz, 11.2-11.45 GHz and 12.75-13.25 GHz. These bands have been allocated to FSS on a worldwide basis, but the IAC saw an opportunity (based on the current level of usage in these bands) to provide reverse band sharing for MSS feeder links. It is doubtful that MSS and FSS could share these bands even with

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1/ GE Americom also opposes allocations in the 17.7-17.8 and 17.8-18.1 GHz bands, since these bands are used in all regions and are used in Regions 1 and 3, respectively, for BSS uplinks. Potential interference from transiting LEO systems could potentially cause interference to millions of BSS subscribers worldwide. Moreover, operation of GEO Ka-band systems operating in the bands 17.7-20.2 GHz downlink and 28.5-30.0 GHz uplink should be protected by RR1613 from interference from non-GEO MSS feeder links.

2/ It should also be noted that TRW's requested allocation (listed in footnote 72) falls outside the proposed 29.0-29.5 GHz band. However, the total allocation requested by Motorola and TRW is 500 MHz. While GE Americom does not favor operation by Motorola in the 29.0-29.5 GHz band, it is the opinion of GE Americom that the spectrum of TRW and Motorola should be concurrent, thus providing FSS operations a continuous spectrum resource. In addition, GE Americom questions the statement made in Table 1 that dual polarization is not feasible above 16 GHz. GEO operation using dual linear polarization has been proven successful by the NASA ACTS satellites at Ka-band. Further, Teledesic (LEO) and SpaceWays (GEO) have each proposed left and right circular polarization for their systems. Since dual polarization is indeed possible, the requirements for spectrum above 16 GHz for MSS systems can be reduced by 50%. This would greatly reduce the amount of spectrum affecting the FSS allocations at Ka-band.

the benefit of a reverse sharing mode. Thus, in an attempt to provide more spectrum for MSS services, the proposal effectively prohibits use of certain bands for FSS services.

The shortcomings of the MSS proposal in this regard are not mitigated by the fact that the bands in question are not heavily used today by existing FSS services. Current regulations make the bands economically inefficient because they limit the number of satellites that a country can operate. Further, every ITU signatory is provided an orbital position, which has resulted in underutilization of certain bands (including the bands targeted in the proposal) at the same time that unplanned portions of the C and Ku bands have reached capacity worldwide. 3/ This has made it difficult for countries that require additional satellite capacity to find appropriate spectrum for their operations.

GE Americom suggests that at WRC-95 the Commission propose the elimination of the requirements of AP-30B with respect to the bands in question. This action would give these bands a status similar to the current unplanned allocations, and, in turn, relieve some of the congestion in the current C and Ku domestic bands. 4/ This action also might provide a means for financially capable countries to provide service to those countries that were supposed to be protected by the requirements of AP-30B.

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3/ Indeed, the latest processing round for U.S. satellites in the C and Ku bands will probably fill the North American arc. At the same time, filings by countries such as Brazil and Argentina must be accommodated.

4/ A compromise position would be to offer a sort of "right of first refusal" to individual signatories to use their allocated spectrum.



**B. The Commission Should Not Prejudge the Use of the Ka-band in the WRC-95 Process.**

GE Americom also is specifically concerned by the NOI's discussion of use of the Ka-band for MSS feeder links. As the Commission knows, the 28.5-29.5 GHz band is the subject of a pending rulemaking. As indicated, it is unlikely that sharing between MSS and geostationary systems can be accommodated on a co-frequency basis in this band.

GE Americom will not reargue its position regarding the Ka-band here. For present purposes, it is sufficient to emphasize our view that MSS feeder links should not be located in the Ka-band at all. But if the band is to be shared, it must be shared on an equitable basis without prejudice to the needs of FSS operators for expansion capacity. It is critical that no actions be taken at WRC-95 that are inconsistent with the Commission's ability to achieve this result.

Thus, for example, the United States should not eliminate RR2613 for this band. We oppose the position of Teledesic that RR2613 should be neutral to system type. Unacceptable interference will occur when a Teledesic satellite transits between a geostationary satellite and its respective receiving or transmitting earth station. The United States should not advocate positions at WRC-95 that prejudice resolution of this serious issue.

Current MSS applicants for Ka-band spectrum will use the entire 2.5 GHz of available bandwidth. Teledesic has proposed operation in 1.8 GHz of the spectrum. Operation of non-geostationary FSS Teledesic is probably incompatible with operation of geostationary FSS, which may result in some band segmentation or the use of RR2613 with respect to Teledesic. And, as indicated, it is highly unlikely that operations such as Motorola or TRW feeder links can coexist in this band on a co-frequency basis without the requirements of RR2613.

**C. If Reverse Band Sharing is Initiated in the Planned Bands, Various Steps Should Be Taken to Protect FSS Services.**

Should MSS be allowed to share the planned bands, the following additional steps should be taken to protect FSS services. A PFD limit should be established at the geostationary arc with respect to transmissions by MSS satellites. This limit should be set so as not to allow interference with ongoing VSAT type communications between a VSAT SCPC earth station and the geostationary satellite. This value should be at least as low as the -168 dBW/m<sup>2</sup>/4MHz proposed in the Second NOI. <sup>5/</sup> Also, VSAT receive stations should be protected from MSS feeder link station uplinks. Further, to allow equal access to the appropriate spectrum, it will be necessary to coordinate distances or frequency limits of access at particular feeder link stations.

**D. Allocation of the 13.75 - 14.0 GHz Band.**

Finally, GE Americom supports the Commission's proposal that the 13.75 - 14.0 GHz band be allocated on a primary basis for FSS service. It should be noted that the counterpart band of 11.45 - 11.7 GHz is allocated as an international band only in the U.S.

**II. ADDITIONAL NVNG SPECTRUM SHOULD BE ALLOCATED AT WRC-95 IN ORDER TO MEET THE GROWING, WORLDWIDE DEMAND.**

GE Americom strongly believes that the public interest would be disserved by any material delay in the authorization of additional NVNG operators. GE

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<sup>5/</sup> GE Americom takes note of the PFD limits suggested in No. 2575 to protect the GEO satellite service uplink from interference. This value (-168.0 dBW/m<sup>2</sup>/4kHz) is probably acceptable in bands that are not currently in wide use. This limit should not, however, be used as a precedent for sharing FSS bands that are heavily used. For example, some currently existing SCPC traffic could be adversely affected by carriers of this level.

Americom can proceed with construction, launch and operation of its NVNG system immediately after authorization within the current allocation, but we also highly recommend that the Commission use all efforts to obtain the additional spectrum necessary to ensure that NVNG service will meet NVNG demand. As the number of applicants in the Commission's second NVNG processing round demonstrates, NVNG service will play a significant role in the nation's telecommunications infrastructure over the next decade. Spectrum below 1 GHz is equally in demand around the world for use with such low earth orbit mobile satellite systems. However, the current allocation of spectrum does not come close to satisfying customer requirements.

For these reasons, the United States should strongly advocate allocation of additional spectrum below 1 GHz at WRC-95. The time for this action is more than ripe. WRC-92 allocated additional NVNG bands on a secondary basis. To meet the projected demand for NVNG by the year 2000, the technical requirements of system design and construction require allocation by 1995. GE Americom recommends certain frequencies as apparently suitable for NVNG use, and requests that the Commission consider these recommendations in support of allocation of sufficient additional spectrum to satisfy the needs of the millions of mobile customers for this service.

**A. The Current Allocation Is Insufficient to Meet Customer Demand.**

The 1995 demand projections for NVNG spectrum far exceed the estimates made in 1992. In 1992, it was estimated that NVNG providers could reasonably serve 6 million transceivers by 2000. Consequently, WRC-92 allocated, on a worldwide, primary basis, 3.425 MHz of spectrum to what was then a new service. The estimated market for NVNG, however, has increased considerably since 1992. Surveys of professionals and end users working in the utility, transportation, e-mail

and information management industries predict an aggregate North American market of approximately 13 million user terminals within the next 5 years. There is no question that a 13 million user market would support a large number of NVNG systems. There is also no question that the 3.425 MHz currently allocated simply cannot sustain the increased number of systems. Studies indicate that a single MHz of spectrum should support about 500,000 user terminals. The current allocation of 3.425 MHz supports only about 2 million user terminals. Moreover, market demand is expected to grow even beyond 13 million in the future.

The call for additional spectrum that would triple or quadruple the current allocation also is supported by the number of systems that have been proposed. Worldwide, 25 NVNG satellite systems seeking to operate below 1 GHz are currently before the ITU. In the Commission's most recent processing round for NVNG, five additional applicants joined the three from the first processing round, all of which paid the \$250,000 filing fee. GE Americom is one of those eight NVNG operators, and will begin work on its NVNG system as soon as the Commission acts on the second-round applications.

According to its agenda, WRC-95 will consider allocating additional spectrum to this service. The task group set up by the International Telecommunication Union ("ITU") Radiocommunication Sector to study the issue recommended an additional 7-10 MHz of spectrum be allocated on a primary basis at WRC-95 in order to meet the projected demand for the year 2000. GE Americom submits that allocation of an additional 10 MHz is, at least, a good place for WRC-95 to start. Allocation of an additional 10 MHz would allow fully operational NVNG operators to satisfy the increased demand for service pending future action at a later WRC. 6/

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6/ This is conservative. As indicated, GE Americom anticipates the NVNG market will continue to grow, such that additional spectrum allocations for NVNG will be needed at future WRCs.

**B. It is in the Public Interest to Allocate Additional Spectrum at WRC-95.**

The public interest would be served by allocation of additional NVNG spectrum now, rather than at WRC-97 or later. The competition resulting from the increased availability of spectrum would bring more highly useful, economical, and technically sound mobile satellite services to consumers within five years. As the eight NVNG applicants currently before the Commission have demonstrated, many potential uses of this service exist that would greatly improve, among other things, the way corporations do business, the way scientists perform research, and even the way the world confronts large scale crises.

The GE Americom system, for example, will consist of 24 LEO microsatellites that will link customer transceivers and GE Americom command centers. The pocket-size customer transceivers will acquire and store sensor data that will allow geopositioning, messaging and data relay service throughout the United States and virtually anywhere on earth. GE Americom expects significant market demand in the area of position determination and tracking of shipping containers. The GE Americom NVNG system will greatly improve cargo tracking efficiency, lower costs to shippers and ultimately improve service to consumers. The system will also assist the trucking industry in tracking vehicles and transmitting data. Moreover, GE Americom's NVNG technology will increase the efficiency of a variety of government functions including law enforcement activities and public safety operations.

As the studies discussed above have indicated, demand for such NVNG services is increasing and will be very large by the year 2000. It will take years to design, build and implement systems to provide these services, regardless of the frequencies allocated. Failure to allocate enough spectrum for NVNG at WRC-95 will increase system costs, curtail choices for operators and consumers and limit the

United States' ability to develop and market telecommunications services worldwide.

### **III. CERTAIN FREQUENCIES WOULD POTENTIALLY BEST SERVE NVNG OPERATORS.**

#### **A. Standards for Possible NVNG Frequencies.**

There are several factors that dictate choice of NVNG spectrum. First, NVNG systems must be able to share allocated bands with existing users without causing harmful interference or constraining the growth of those users. The type of user in a particular band determines whether such band would be suitable for use by NVNG. For example, fixed and mobile services generally function well within the same band because both use intermittent signals. FDMA systems can therefore employ very brief transmissions without causing interference. In addition, the Fixed and Mobile services employ base stations of 50 Watts or less and individual mobile stations of 5 to 10 Watts, causing moderate levels of interference. Those NVNG systems that operate using spread-spectrum technology can therefore operate in broad sections of the band without causing harmful interference to voice users. On the other hand, services that use persistent, high-powered transmissions, like radar or paging, preclude frequency-hopping by FDMA systems and cause too much interference to spread-spectrum systems.

Second, in order to have truly efficient and marketable products, NVNG operators must be able to operate consistently on a worldwide basis. To this end, NVNG spectrum should be allocated in such a way that individual countries do not restrict the operation of the systems in any unusual way.

Third, the costs of end user operation should be low in order to achieve full use of the NVNG systems. NVNG service will be the most economical when an inexpensive mobile user terminal is available to consumers. Research has shown

that certain frequencies are well-suited to keeping terminal costs down. In order to avoid constructing separate antennae for receiving and transmitting from the same terminal, the up and down link frequency bands require separation by 15 percent or less. The best frequency bands for NVNG, therefore, are between 100 MHz and 1 GHz.

**B. Potentially Suitable Bands for NVNG Systems.**

GE Americom strongly recommends that WRC-95 allocate, at the very least, 312 - 315 MHz and 387 - 390 MHz to NVNG systems. Those bands are the most amenable to sharing by NVNG operators with existing users. WRC-92 allocated these bands to NVNG on a secondary basis in footnote 641. Given the undeniable demand for NVNG spectrum, however, the Commission should push for allocation of these bands on a primary basis.

The allocation of the 312 - 315 MHz and 387 - 390 MHz bands on a primary basis would provide only an additional 6 MHz of spectrum, and as discussed above, market demand requires an allocation of at least 10 MHz at WRC-95. We also recognize that these bands currently are set aside for use by the U.S. government. The following bands could also work for NVNG systems given the standards discussed above, and could be used to supplement the two preferred 300 MHz bands. <sup>7/</sup>

(1) 152.855 - 156.2475 MHz and 157.1875 - 173.2 MHz: These bands are currently allocated on a primary basis to non-government land mobile in the U.S. and to FSS and MSS in Regions 1, 2 and 3. In the U.S., these bands are used for communications networks for railroads, power utilities, police radio, highway

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<sup>7/</sup> Other potentially suitable bands for NVNG operations are (1) 138 - 141 MHz (space to Earth); (2) 141 - 144 MHz (Earth to space); (3) 225 - 235 MHz (space to Earth); and (4) 399.9 - 400.05 MHz (bi-directional).

maintenance crews, forestry and oil spill cleanup. These bands could be suitable for NVNG because of the intermittent nature of the transmissions of the current users.

(2) 216 - 218 MHz and 219 - 220 MHz: These bands are currently allocated to maritime mobile in Region 2, to fixed, mobile and broadcasting in Region 3 and broadcasting in Region 1. In Region 2, these bands are used for inland waterway transportation, including the Mississippi River, its tributaries and in Puget Sound. The bands have limited geographic use and a fixed number of receivers which make them possible candidates for sharing with NVNG in Region 2. Additional analysis of use in Regions 1 and 3 would be done before choosing this spectrum.

(3) 470 - 512 MHz: Other commenters support allocation of these bands which are currently allocated to non-government broadcasting and land mobile on a primary basis and fixed and mobile on a secondary basis in Region 2, broadcasting in Region 1 and fixed and mobile in Region 3. Further analysis of the utility of these bands would be necessary before it is allocated to NVNG.

(4) 450 - 460 MHz: These bands are currently allocated to fixed and mobile in Regions 1, 2, and 3 (450-451 and 455-456 allocated to Auxiliary Broadcasting also). In the U.S. is used primarily by a variety of private mobile radio. In addition, U.S. footnote 87 allocates 500 KHz for government and non-government space telecommand under certain conditions within the 450 - 451 MHz band.

## CONCLUSION

GE American opposed any action at WRC-95 that would interfere with opportunities for FSS service expansion to meet new customer requirements. In particular, the Commission would not advocate MSS use of FSS bands on any basis other than the current RR216.



In addition, GE Americom recommends that allocation of additional spectrum for this NVNG service take priority at WRC-95, rather than be delayed until WRC-97 or later.

Respectfully submitted,

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